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# THE COMPARATIVE ACCURACY OF THE AYRES HANDWRITING SCALE, GETTYSBURG EDITION

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## PROBLEM

This is a report of an experiment devised to measure the comparative accuracy of the revised Ayres Handwriting Scale, called the Gettysburg edition, and the three-slant edition published by the same author. It is assumed that the principal justification of the new scale would be its greater accuracy, when compared with the older one, as a measuring instrument.

## METHOD

The experiment included two series of tests. The first series was conducted as laboratory work in connection with a university course in educational measurements. Six advanced students without previous experience in the use of handwriting scales and without knowledge of the problem each scored 300 samples of handwriting by both the scales mentioned. They were directed to score all papers by both scales as accurately as they could without instruction during the progress of the work and without consulting the scores of others or their own previous scores by a different scale. Discussion of problem and results was deferred until after the scoring was completed.

The six scorers were randomly divided into two groups of three each. The samples of handwriting consisted of three lots of 100 samples each, arranged in sets of 25. The samples were scored in their numerical order from 1 to 300. In order to equalize the effects of practice, Group I began the scoring with the three-slant edition, Group II with the Gettysburg edition. After scoring 25 samples by one scale, each scorer was required to score the same 25 samples by the other scale.

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In the hope that some light might be thrown on the relation between the accuracy of the scales and the similarity of content in scale and copy material, samples with three different copies were used: Samples 1 to 100 contained material selected from the three-slant edition; samples 101 to 200, the copy of the Gettysburg edition; samples 201 to 300, "Mary had a little lamb." All the writing was done by pupils in the upper elementary grades.

TABLE I  
FORM OF TABULATION  
Three-slant Scale, Three-slant Copy, Group II

Sa	SCORES						Average	DEVIATIONS						Average Deviation
	BT	WL	JM	ED	MG	ECD		BT	WL	JM	ED	MG	ECD	
1...	80	40	40	40	50	40	48.33	31.66	8.33	8.33	8.33	1.66	8.33	11.11
2...	60	40	40	40	30	60	45.00	15.00	5.00	5.00	5.00	15.00	15.00	10.00
3...	20	30	30	20	20	20	23.33	3.33	6.66	6.66	3.33	3.33	3.33	4.44

The copy for samples 1 to 100 was as follows:

### THREE-SLANT COPY

Ichabod prided himself upon his dancing as much as upon his vocal powers. Not a limb, not a fibre about hero the himself vegetation families same the upon eye his of scenes inhabitants of the valley and fiction becoming awe inspired that Ichabod jogged away at the stranger's appearance surprised not been home we had of country cheer guests the of bashful square built passed by with flourish Daughters there with romped his by called city and rider forwards pears and peaches and beef smoked by tune psalm of the pedagogue affrighted hair in devil lurking puny mere your country cheer good at the flourish but no traces of upon eye enterprise same the do to gesture his best country the in into spirit own his of so left more little was there had estate his through that The appearance of Rip ever with delight passed by the find still not should labor profitable kinds it should parlor painting the and felt proud judge may we if day him in rusty fowling piece.

The scores and deviations were tabulated in the form shown in Table I. The mean average deviation of the scores was used as an index of accuracy. This value, found by averaging the values in the final column of the table, was calculated for each scale and each group of scorers with each lot of samples, making in all twelve coefficients of error, six for each scale.

## RESULTS

Table II shows the results in the first series of measurements:

TABLE II  
COMPARATIVE ACCURACY OF AYRES'S HANDWRITING SCALES  
Order of Scoring Samples: 1 to 300

COPY	NUMBERS OF SAMPLES	MEAN AVERAGE DEVIATION	
		Three-slant Edition	Gettysburg Edition
Three-slant.....	1-100	6.51	5.99
Gettysburg.....	101-200	6.13	5.44
Little lamb.....	201-300	5.44	4.45

An examination of the table reveals the fact that in the case of each lot of samples the mean average deviation, or error, was greater for the three-slant edition.

With both scales the amount of error decreased as scoring continued, the decrease being greater in the case of the Gettysburg edition. This decrease seemed to be due either to change of copy or to improvement with practice. In order to determine the relative effects of these two factors, as well as to verify the foregoing finding concerning the relative accuracy of the scales, a second series of measurements was conducted with six other scorers, selected, directed, and grouped like the first. In this series the same plan of scoring as in the first series was followed, except that the three lots of samples were scored in the reverse order, and in sets of 50 instead of 25. For convenience the samples were scored as listed in Table III with the same result, for present purposes, as would have been produced by an exact reversal of order. The results of this series are given in Table III.

The accuracy of the Gettysburg edition was found to be greater than that of the three-slant edition in the scoring of two of the three lots of samples in the second series of measurements.

Though the order of scoring the samples had been reversed, the error of the Gettysburg edition again decreased as practice with the scale increased, indicating that the progressive decrease in error was a practice effect rather than an effect of difference in copy.

In Table IV is given the average amount of error for the two scorings of each of the three copies by each of the two scales. The three kinds of copy—one similar in content to the material of the three-slant scale, another identical with the material of the Gettysburg scale, and the third bearing no special resemblance to either—were selected, as previously stated, with a view of determining

TABLE III  
COMPARATIVE ACCURACY OF AYERS'S HANDWRITING SCALES  
Order of Scoring Samples Reversed

COPY	NUMBERS OF SAMPLES	MEAN AVERAGE DEVIATION	
		Three-slant Edition	Gettysburg Edition
Little lamb. . . . .	201-300	7.02	7.59
Gettysburg. . . . .	101-200	8.28	6.19
Three-slant. . . . .	1-100	7.93	5.93

TABLE IV  
COMPARATIVE ACCURACY OF AYRES'S HANDWRITING SCALES  
Summary of Average Errors

COPY	NUMBERS OF SAMPLES	AVERAGE ERROR	
		Three-slant Edition	Gettysburg Edition
Three-slant. . . . .	1-100	6.51	5.99
Average. . . . .		7.93	5.93
Gettysburg. . . . .	101-200	6.13	5.44
Average. . . . .		8.28	6.19
Little lamb. . . . .	201-300	5.44	4.45
Average. . . . .		7.02	7.59
Average. . . . .		6.23	6.02
Average. . . . .		6.89	5.93

whether or not the accuracy of these handwriting scales increased with the increase in content resemblance between scale and copy material. In Table IV it will be observed that when identical content was scored by the Gettysburg edition the average error was 5.82; when different content was scored the average error in one case was 5.96, in the other 6.02. When similar content was

scored by the three-slant edition the average error was 7.22; when different content, 7.21 and 6.23. That is, when the Gettysburg edition was used on copy of identical content its average coefficient of error was lowest. When the three-slant edition was used on copy of similar content its coefficient of error was highest. However, in interpreting these results, consideration must be given to the fact that the similarity between scale and copy content mentioned in connection with the three-slant edition was slight. In spite of the fact that this copy was composed of material selected from various parts of the three-slant scale, the amount of content resemblance between the copy and a large majority of the samples on the scale was small or negligible. There is some evidence, therefore, that the accuracy of the Gettysburg edition is greater when scale and copy content are the same. Additional experimentation will be necessary to establish the fact and amount of this increase. The point involved is an important one in the construction of scales. Theoretically, it seems, the accuracy of a scale, built on the principle of the ones with which we are dealing, should increase as similarity increases between the content of the scale and that of the educational product to be measured. The problem arises every time one attempts to measure a description of a street by a description of Venus de Melos, or the drawing of a man by drawings of houses and trees.

The combined average errors presented in Table IV indicate in slightly different form the superior accuracy of the Gettysburg edition in scoring each of the three lots of samples. The average errors were 7.22 as opposed to 5.96 for the first hundred samples; 7.21 as opposed to 5.82 for the second hundred samples; and 6.23 as against 6.02 for the third hundred, the larger error being in each case charged to the three-slant edition. The results on the relative accuracy of the two scales may be summarized in the figures for total average error given in Table IV: three-slant edition, 6.89; Gettysburg edition, 5.93.

#### CONCLUSIONS

1. In two series of tests the Gettysburg edition of the Ayres Handwriting Scale was found to be more accurate as a measuring

instrument than the three-slant edition. The average error of the former was 5.93; of the latter, 6.89.

2. The error of measurement decreased as practice, without instruction, increased.

3. The accuracy of the Gettysburg edition seemed to increase as the similarity increased between scale and copy content.

4. There is need of determining quantitatively the relation between accuracy of measurement and similarity in scale and measured content.